

The Public Debate of Climate Change

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I. Background

Why do we need to assess the Public Debate of the Climate Change Controversies?

Answers: A) Because “getting this wrong will be very costly;”¹ and B) Many ‘sides’ of the various controversies have sincere, highly-credentialed advocates.

What qualifies me to conduct such an Assessment?

Answers: A) My credentials; B) I’m untainted by money; C) Outsider status; and D) I’m highly motivated. Appendix A contains considerable detail.

Key Assumptions: A) Public opinion will matter a lot; and B) It is up to reform advocates to be persuasive – to substantively answer reasonable questions.²

Since the attitudes of educated laypeople will determine what the policymakers do, we need an objective assessment of the key elements of the debate at that level. Where is it misleading? What needs more attention? Addressing those issues is the purpose of this assessment. Therefore, the assessment will examine Wikipedia and some key advocacy group websites, and look at scientific, including economic, information from a very basic perspective. The assessment does not assert a climate change attitude or position; only perspectives and content for a more productive debate.

II. Perspective - Atmosphere Facts

Water vapor is responsible for most (about 36-70%) of the total greenhouse effect. Wikipedia does not say whether the wide range of uncertainty (36-70) is due to unsettled science or because the size of the water vapor effect depends on temperature, or other factors.

Plant removal (‘deforestation’) has conflicting effects on the atmosphere’s greenhouse effects: A) Plant removal releases CO₂; and B) Lessens water vapor. This is a source of potential confusion for the non-experts that dominate public opinion. “Recent [calculations](#) suggest that carbon dioxide (CO₂) emissions from deforestation and forest degradation (excluding peatland emissions) yield about 12% of total human-caused carbon dioxide emissions with a range from 6% to 17%.” The Inter-Governmental Panel on Climate Change (IPCC) says the percentage is as high as 33%.

Between 30% and 55% (depending upon the [readily found sources](#)) of human CO₂ emissions go into the ocean, where the result is widely, misleadingly, called “Ocean Acidification,” even though under that heading, Wikipedia’s [first sentence](#) states that, “ocean acidification involves a shift towards pH-neutral conditions rather than a transition to acidic conditions (pH < 7).” I get that ‘Less Alkaline’ is less attention getting than “Acidification;” but the facts demonstrate that ‘Acidification’ is an irresponsible term. The data and model projections create opportunity for counter-productive sound-bite wars. Those seeking costly policy responses to the atmosphere’s

growing CO₂ content will cite that the combination of actual and projected pH change “is faster than at any time in the past 300 million years.” The folks not-yet-ready to support financing huge reductions in carbon emissions will note that the projected pH change is from 8.069 now to 7.824 in 2100, which seems small and still well short of acidic.

The earth is in a warm interglacial period of an ongoing ice age that began about 11,000 years ago. [Past evidence](#) demonstrates that large natural changes in temperature occurred over just years (large volcanic eruptions) or decades (changes in the sun; earth orbit variance; methane releases). Such large, abrupt natural changes could offset *or* reinforce effects of economic activity.

The current atmospheric concentration of CO₂ (the asserted basis of the warming effect) is 412.6 parts per million (ppm); growing at just under 2 ppm per year. [About 1/3 of the atmosphere’s carbon is the result of human activity](#). One side of the climate change debate says that the current trend will yield catastrophic consequences in 12 years (also said over 12 years ago); that is, when CO₂ concentrations reach 430-440 ppm. To be clear, that side does not allege that we’ll see catastrophic consequences in 12 years; ‘only’ that 12 more years of ‘business as usual’ will make terrible consequences unavoidable. Partly for the same reason - because it is hard to significantly, rapidly change atmospheric CO₂ concentrations - others say that reducing CO₂ emissions will not quickly reduce the climate change risk very much.

There has been criticism of the label switch from ‘Global Warming’ to ‘Climate Change.’ I agree with the switch to the broader term. 1) There is much more of importance to possible changes in weather patterns than just temperature. Where, when, and how much it rains is one of several other possible important changes. And: 2) the switch helps discourage pseudo-science by anecdote. For example, many people have said that global warming must be a hoax because it is cooler where they live, or real because a glacier melted somewhere!?!?! There can be net warming/cooling even while some areas cool/warm. Indeed, that is quite likely.

III. Bizarre Laser Focus on Human Blame and CO₂

My internet searches did not yield a clear articulation of why human blame matters. Seemingly, all sides of the controversy assume that if the causes of change are natural, that nothing can be done. That is false on a few levels (see below), though I definitely grasp that the extent of human responsibility for Greenhouse Gas (GHG) emissions will affect mitigation cost.

To the educated layperson, *the feared effects of significant warming are approximately the same regardless of the degree of human responsibility for them*, and regardless of which change in the atmosphere is the culprit. For example, we recognize that methane is a powerful GHG, we pay some attention to human sources of methane, and there are jokes about regulating cow flatulence, but we pay little attention to significant natural sources of methane that warming, natural or human-induced, may release into the atmosphere. The geologic record contains [evidence](#) of such releases.

I recognize that it is possible for the effects of, say, a 4°C naturally-induced average rise to be distributed over the earth - for better or worse - differently than the effects of a human-caused rise. BTW, it is worth noting that the earth’s relatively recent history contains many fluctuations in temperature way above the below-2°C-rise-goal of the Paris Accord.³ If one of those natural jumps was imminent, I hope we would consider ways to avoid major damages. ‘[Geo-engineering](#)’ (more on that below) can perhaps be made to acceptably address imminent natural warming, but virtually everyone seems committed to ignoring changes not proved to be human-caused!?!

It is very interesting that Wagner and Weitzman (in *Climate Shock*, 2015) use the analogy of a low but significant probability of a large asteroid striking the earth to argue for a precautionary, costly, large reduction in GHG emissions. The asteroid's path is 'natural,' yet they correctly argue for some preparation so that, if necessary, we can deflect it.

There is at least one climatologist arguing that [changes in the sun](#), NOT human activity, will cause *significant warming by 2100*. Do nothing if imminent natural factors are likely to dominate the causes of costly warming?!? I hope not.

Conversely, a very prominent scientist (Mörner, who quit the IPCC) says significant, solar-induced cooling is due by mid-century.⁴ We are, after all, in a pause in an Ice Age. If Mörner is right, we better not discourage the use of fossil fuels. At least for a while, we'd want additional greenhouse effect. Those two very different highly credentialed opinions, alone, establish that some very important science is not settled.⁵ Likewise, a comparison of actual data to projections by the popular models shows the models predicting temperatures above what actually occurred.⁶

The point here, in section III of this preliminary assessment, is that significant warming or cooling is policy relevant regardless of the extent of human origin. Again, certainly, the extent of human origin will affect the costs in a Benefit-Cost Analyses. But it may still be cost effective to avoid a natural catastrophe. Especially after some investment in response cost reduction, surely it would be.

IV. Bad Attitudes Produce Bad Results

One of the key reasons I undertook this assessment was my sense – just from casual news exposure – that proponents of rapid de-carbonization were over-playing their hand. Driven by a sense of urgency, they made always-crazy claims such as 'settled science,' and otherwise acted reckless and arrogant. "[This is scary](#), because where efforts by elites to silence dissent have succeeded, things haven't ended well, even for those who instigate them [bullying efforts]."

Those acts began before there was ANY basis for an informed answer to the central question of the potential for action that would yield benefits exceeding high costs. That is true even if the benefits are certain. There is significant model reliability uncertainty, and many uncertainties will survive every model improvement effort. I recognize that once someone becomes convinced that a rapid, focused policy response is **needed**, that it is rational for them to choose between: a) attacking doubters;⁷ or b) aggressively providing substantive responses to doubt. Clearly, the woman in the photo below is such a [sincere] person. She is sure that inaction on carbon emissions is insane.



Yet, some leaders that say they agree with her (rapid, big steps needed) [buy oceanfront property](#), and they won't spend political capital to attack fallacy-based resistance to profitable and cheap ways to significantly reduce GHG emissions. The profitable ones are 'no-regrets.' Their non-GHG benefits exceed their obvious costs (discussed below), so they yield a double dividend. I'd be willing to spend political capital to capture GHG reductions as a double dividend. For **example**, some congestion-reducing policies (see below) would yield significant GHG reductions.

US cities' Climate Action Plans are examples of high symbolism, low substance 'leadership.' They omit controversial 'no regrets' policies. Strategies with an obvious cost are rare. There are no cost estimates, so no benefit-cost analysis. Such behavior implies that political opportunism, not catastrophe aversion, is the dominant motive. They exploit fear for political gain.⁸

My examples, below, show that the failure to achieve sufficient progress on policies with a chance to cost-effectively, significantly reduce heat retention has not changed many groups' strategy to attack doubters. I do not rule out other reasons (laziness, corruption, [rentseeking](#), virtue signaling, exploitation of poor educational attainment), but I want to stay focused, mostly, on the making of the case to spend trillions, sometimes unilaterally, often to just slightly reduce carbon emissions.

Responsible organizations do not exploit that we decide big issues by polling an over-extended electorate 'educated' by school systems that have earned [six](#) bipartisan and nonpartisan '[Nation at Risk](#)' condemnations. Responsible organizations engage skeptics and refute doubt. That requires doing due diligence to avoid weakly supported and ridiculous claims, and avoid dishonest terms (e.g. 'clean'; 'acidification'). That is especially important now that attempts to shame and bully skeptics has [failed](#) to yield an international response consistent with some dire model predictions. I base my determination of inadequacy not on the Paris Agreement, but on the [widespread failure to keep promises](#), and significant deferral of promised emission reductions. For example, China promised to eventually do a lot, but what they are doing, now, is adding a lot of coal-fired electric generating capacity; investments that are typically not quickly mothballed.

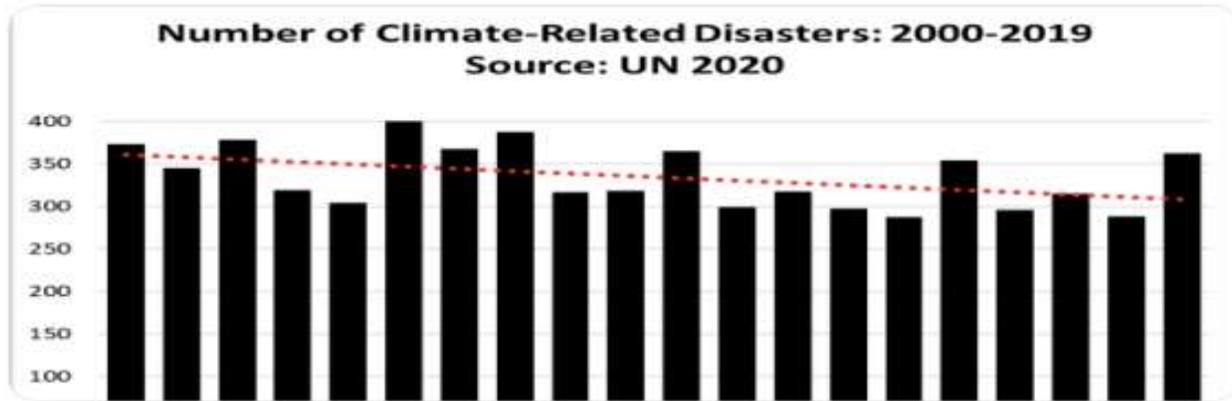
For this assessment, I visited the websites of some prominent organizations on the two main sides of the climate change debate. On the 'do a lot, fast' ('alarmist' is too extreme for me) side, I visited the websites of the Sierra Club (**SC**), Climate Leadership Council (**CLC**), Environmental Defense Fund (**EDF**), and the Natural Resource Defense Council (**NRDC**). I also read the most recent IPCC report. On the 'business-as-usual' side, I visited the websites of the Alliance for Wise Energy Decisions (**AWED**), Committee for a Constructive Tomorrow (**CFACT**), and the Heartland Institute (**HI**). All eight are laser-focused on CO₂ and human-induced change, as is every other 'player' that I came across; *not good*. Milton Friedman said that one man and the truth is a majority, and Winston Churchill said, "If you don't look facts in the face, they have a way of stabbing you in the back." So, I'll stand behind my critique of that focus (section III, above). [Galileo](#) paid, dearly, for asserting that the earth is round; likewise, [Alfred Wegener](#) for daring to assert moving continents. I also read [Zeckhauser](#)'s proposed three-step approach, Wagner and Weitzman's *Climate Shock*, and much discussion of William Nordhaus' DICE model.⁹

SC, EDF, and NRDC (CLC later) – Do a Lot, Fast

At [sierraclub.org](#), first under "Explore Issues" is "Climate and Energy." This quote is next to an article link entitled, "[The Climate Crisis is Here](#)."

"The unprecedented scale of these disasters reinforces that we must do everything in our power to limit the extent of the climate change that is already making storms wetter and wildfires hotter." – Michael Brune

The Brune quote does not contain a link to data analysis that substantiates the claim. I've not heard that the earth is getting more precipitation ("wetter"), and I've seen the [best available compilation](#) of tropical storms, and I see no medium term, or long-term, trend in those data. Also, note these data (graph below) - underlying the claim of a [United Nations study](#) that weather disaster *costs* are rising - fail to show any upward trend in severe weather events. As [this](#) critique shows, the *cost* of the disasters has risen in step with increased economic activity, especially along vulnerable coasts.



UNDRR data shows that “climate-related” disasters have declined over the past 20 years (2000-2019)

Ridiculous: SC argues that “100% clean” is a realistic, wise objective. They do not know better, or they expect honest nuancing to harm ‘the cause?’ They must believe that more people will buy the ridiculous ‘clean’ claim because wind and solar collect energy with zero emissions, than will revolt at the dishonesty in claiming that there is such a thing as clean energy. Nuclear also generates electricity with zero emissions, but virtually everyone recognizes a nuclear waste issue,¹⁰ and a few point out that nuclear power requires much concrete (for safety + waste disposal); major GHG emissions from cement-making. SC did not recognize that their favorite fossil fuel substitutes have big environmental effects, including some GHG emissions. Solar panels and wind turbines require materials, maintenance, and disposal that is not just costly in dollars, but in environmental effects. There was no mention of the possibly, environmentally catastrophic effects of electric vehicle mandates.¹¹ Certainly, those environmental effects would add to the concerns that the impacts on raw material demand could make EVs much more expensive in the traditional sense.

And then there is the ‘100%’ part of the “100% Clean” goal: ‘Major expansion of cleaner (if it is) energy use’ may not sound as cool as “100% Clean,” but like ‘less alkaline seawater’ (vs. “acidic”), it is not dishonest. In any credible scenario, retaining some fossil fuel use is much more economical than total abstinence. That follows from a bedrock economic principle that the last few percent of anything is very typically, astronomically costly. That will be especially true until energy storage becomes much more economical; economical enough to eliminate intermittency challenges. Even in a large network, there will be times when it isn’t windy enough, or sunny enough, that we will need back-up from some rapidly started generators.

SC did not specify the key elements of a much more renewable-energy-dependent system. Having read widely, @bigpicturedoc (my handle) surmises that these factors will be important: 1) large network; 2) ‘smart’ rates and meters to shift some demand to high supply times;¹² 3) cost-effective storage, where available; and 4) greater concern for efficiency, generally. SC did not note the significance of battery technology, or existing, often cost-effective storage technologies. Chief among those is pumped storage. With two large nearby water basins with a significant elevation difference, we can recover 70% of the surplus energy used to pump water from a lower to an upper basin by allowing the water to flow through turbines back into the lower basin during high demand,

low supply periods. I once assumed - possibly, like the vast majority reading this - that the potential to harness pumped storage was very limited (few suitable sites). [But, that assumption is false](#). Due diligence by **SC**, and others, should have discovered and publicized the possibly huge potential to achieve energy storage through pumped storage, *and the environmental costs of doing so*.

And speaking of back-up for intermittent energy,¹³ I was stunned to learn that the combination of wind/solar, and standby natural gas-fired generation, releases more GHGs than continuously-operated gas-fired generation, alone.¹⁴ You may be stunned. Assumptions can be terrible things.

In "[The Climate Crisis is Here](#)," **SC** dismisses (attacks doubters) extensively supported assertions that, "the topic of climate change is controversial and uncertain," and condemns ("climate denial organization") spending to spread that truth.¹⁵ **SC** does a total bear hug of the IPCC summary; no attempt to address extensively documented [concerns](#), including the fact that the IPCC models have consistently over-estimated warming trends. **SC** deemed challenges of the official IPCC consensus as scandalous, even though the IPCC consensus is often unclear, and sporadically, seemingly unhinged. For example, in the [IPCC's scary RCP 8.5 scenario](#) (*BAU* – worst-case scenario), the atmospheric concentration of CO₂ rises *over 5 times faster* than business as usual is raising it now.

Lack of clarity arises from differences between the full IPCC document and the summary (all that most people hear) produced by a steering committee that is not just scientists, and from some failure to address/process substantive dissent. For [example](#), Nils-Axel Mörrner while an IPCC member, [dissented from a central point](#): "They just ignored what I was saying," Mörrner recounted. "If they were clever - if they had facts on their hands - they could show that, 'no, you're wrong.' But that is not the case. They just will not discuss it. I will try to discuss it. I will show with their own data that they are wrong. In science, we discuss. We don't forbid or neglect." IPCC and **SC** refusal to responsibly address substantive dissent is quite alarming! With stakes in the multi-trillions, it is not okay to condemn or ignore [substantive criticisms](#) of a central tenet of **SC** and many others.

In this transition from the Sierra Club (**SC**) to the Environmental Defense Fund (**EDF**), I'll applaud that both avoided the widespread-elsewhere use of the [well-dismantled claim](#) that 97% of climate scientists agree . . . (there are many versions of the completion of that sentence) that human-caused changes in the atmosphere are a big deal. **EDF**'s postings were more extensive than **SC**'s but with one minor exception (just below), no less disappointing. Again, a total IPCC bear hug; no **EDF** posted responses to substantive IPCC criticisms. From [www.edf.org/climate](#): "We see climate change everywhere - in stronger storms, drier droughts and more acidic oceans." Again, there were no hyperlinks to supportive evidence, and as I noted above, scientists do not expect acidic seawater. Some models project slightly less alkaline seawater by 2100. Major storms are not more frequent, or stronger, unless you cherry-pick the start and end years. The marquee **EDF** line says 'drier' while the **SC** marquee Brune quote highlights "wetter storms."

The minor exception is **EDF**'s bare mention of "battery storage," and "the grid," though **EDF** doesn't acknowledge that much more widespread use of wind and solar energy depends on grid expansion and cost-effective energy storage. Implied by **EDF** is a high level of confidence that [battery storage](#) will quickly become much less expensive; no mention of pumped storage.

Even stronger than **SC**, **EDF** asserts the nonsense of "[clean energy](#)." My critique, above, of **SC**'s assertion of 'clean' energy applies even more strongly to **EDF**. **EDF**'s policy "north star" is carbon taxation; setting a price on carbon, which I address a bit further below. Likewise, the [Climate Leadership Council](#)'s 'north star' is a carbon tax policy supported by many economists above my pay grade. Yet like myself, when I first saw the **CLC** proposal, years ago, I assert that they overlooked some critical aspects. So, just below, I dare to criticize some of my profession's superstars.

Like **SC** and **EDF**, **NRDC** asserts the nonsense of “clean energy,” embraces the IPCC findings, and does not acknowledge substantive IPCC criticism. **NRDC** presents an extensive, layered case. Each essay has links to follow, but none address the substantive IPCC criticisms.

In this assessment, I also address the possibly confusing cost discussions, and cost comparisons. A well-conceived carbon tax improves economic efficiency if the market price of carbon-based fuels does not reflect all of the costs to society. You can find [essays that assert](#), from alleged subsidies and ignored social costs, that wind and solar are already cheaper than fossil fuels. Defense of that assertion depends on the definition and value/cost of subsidies and spillovers (pollution impacts). For example, one such essay compares the “average of unsubsidized high and low levelized cost of energy range” for different fuels. That definition has a big ‘black box’ under it. Note from [this article](#), that there is a wide range of US fossil fuel subsidy estimates, and there is a very large range in the [estimated social cost of carbon](#). The alleged subsidy range is [much wider, internationally](#). At the high end, it includes angry (yes!), rough estimates of the cost of alleged spillovers as subsidies. This is an area of much-needed expansion of the assessment to a full audit.

A Nobel Laureate (Stiglitz) [said](#) that the cost of keeping human-induced warming below 2°C is “moderate,” but Yvo de Boer, the former UN climate chief, [warned](#) (2015) that shutting down the whole global economy is the only way to keep global warming below 2°C.

Business as Usual – AWED, CFACT, and HI

[AWED](#) has an extensive, topic-organized information clearinghouse, and they use a [court case](#) metaphor to assert that there is no scientific basis for costly reductions in CO₂ emissions. **AWED** asserts major flaws (many references) in the IPCC process and reports. **AWED** argues, first, that CO₂ rise *follows, not precedes*, warming, and on that basis, alone, seek ‘summary’ dismissal of the argument that human-caused CO₂ emissions should be curbed. **AWED**’s second level of defense asserts that the alleged ‘greenhouse gas theory’ is only a weak hypothesis, and that the number of highly credentialed, theory/hypothesis believers is irrelevant. “What others believe is irrelevant. A trial (the court case metaphor) is about provable facts, not opinions.” For this ‘trial’ about projected effects, I disagree with **AWED**. Such effects are not provable facts. Policymaking will depend upon opinion about the reliability of the projections. Facts can inform opinions, but ultimately public opinion, not science, is critical. Public opinion is often wrong, and sadly, many people in positions of authority will kowtow to public opinion even where facts argue not to.

A key fact: The IPCC’s climate computer models represent our best attempts to inform policy on the relevance of slow-to-change atmospheric concentrations of CO₂. However, many facts argue that the models are not yet reliable enough to support costly policy changes. We struggle to predict hurricane movement,¹⁶ and forecast the weather a few days in advance. For perspective, recognize that there are likely as many [known unknowns and unknown unknowns](#) about 2100, now, as there were about 2020 in 1940. Resources for the Future (**RFF**¹⁷) makes this prescient observation that: “Projections are not forecasts because they depend on [projected] values of variables whose future values are uncertain. So, ***they should not be seen as firm predictions of what actually will occur.*** Projections represent central estimates of future outcomes conditional on many parameter and model assumptions.” Specific grounds for skepticism about projections for the next 80 years include: 1) IPCC central estimates have been on the high side; and as noted above 2) the scariest projections ‘see’ CO₂ concentrations rising at over five times the current rate.¹⁸

The [CFACT](#) homepage has an unorganized, very long list of photo-based article links. As far down as I scrolled, most of the articles are climate-change-controversy related. There is no overview.

CFACT links to <https://www.climatedepot.com/>, but even there, many of the posted articles are not about the climate change issue. The clickable article titles are a hard-to-follow sea of green letters. There is a strong anti-socialism theme; that an alleged climate crisis is a tool to end capitalism.

Though the Heartland Institute (**HI**) is a multi-issue think tank, it is likely best known for its work to establish grounds for skepticism about the view that the IPCC studies provide an adequate basis for costly, huge reductions in CO₂ emissions. Noteworthy **HI** efforts include meetings of a Non-Intergovernmental International Panel on Climate Change (NIPCC), [*Climate Change Reconsidered II: Fossil Fuels*](#), and [*Why Scientists Disagree About Global Warming*](#). At www.heartland.org, at 'Topics,' we find the [*Arthur Robinson Center*](#). It has six photo-based, article links, some prominent quotes, and a graph comparing temperature observations, through 2016, to the average for 102 CMIP-5 model projections. Like the chart I hyperlink-referenced earlier, the **HI** graph shows the projected temperatures rising at a much higher rate than actual temperatures. According to **HI**, a second chart shows a "flat global temperature trend." I disagree. I believe that both of the charts show a slight general warming trend; a conclusion that is in line with the many descriptions of actual temperature trends that I recall. Another possibly important area of assessment expansion to a full audit is an examination of how various analysts aggregate temperature observations from around the world into a single number for the entire earth. **AWED** and **HI** posted enough highly-credentialed reasons to reject 'rapid, costly reform is urgent' that the folks that believe assert extreme urgency are obliged to explain why, despite sincere, informed disagreement, that quickly doing a lot of costly things is the wisest course of action.

V. Avoid Price Control

No one, including the Climate Leadership Council's (**CLC**) who's who of economists, discusses the potentially dangerous 'price control' aspects of a carbon tax. Even before possibly policy-relevant climate change became a huge political issue, discussion of Pigouvian taxes (a carbon tax) in my environmental economics course included a caution that governments are really bad at setting or adjusting prices. In the course, I asserted that as a key reason to prefer pollution-motivated interventions that specify the environment's ability to acceptably process wastes (cap), and use emission allowance markets to set the price. That needs to be part of the cap-n-trade vs. carbon tax debate.

In my course's Pigouvian tax vs. cap-n-trade lecture, I pointed out that the EPA had way-over-estimated the likely price of allowances for key Clean Air Act pollutants.¹⁹ That would've been a major problem had the Congress enacted the emissions fee (Pigouvian tax) approach to emission reduction. The best carbon tax rate is highly uncertain,²⁰ and a key political drawback of Pigouvian taxes is that Congress will not set the rate just based on efficiency. If Congress sets a carbon tax rate well above the efficient rate, recognition of that wouldn't assure a reduction. There'd still be considerable resistance to lowering it. Look at the persistence of price controls such as rent controls (NY examples are best known). Those controls survived evidence of very serious consequences.

A perhaps greater carbon tax-related risk is its often-asserted essential partner: a tax credit for carbon removal.²¹ A high payout rate for carbon removal could be too successful. Price signals are clear and powerful. The innovation forthcoming, generally, to sell at a profit at a set-price is a key virtue of '[good capitalism](#).' Unanticipated innovation did arise as a response to the emission offset markets created by the 1990 Clean Air Act Amendments. Such innovation could make the tax credit payout rate so attractive that: 1) there could be excess carbon removal; maybe unlikely, but given the track record of highly motivated innovativeness, not something to be dismissed, or left to be dealt with until after it is evident; and/or 2) adverse distortion of land uses – for example, carbon capture at the expense of food production.

VI. Fiscal Issues

To deflect resistance to a carbon tax, or a GHG emission allowance auction (cap-n-trade), based on opposition to higher taxes, the carbon tax proposal is part of a package that includes cuts in other taxes, or rebate payments (the [CLC proposal](#)). There are important uncertainties associated with the rebate-dividend payments, such as: 1) the means-test; bigger checks for lower income families; 2) uncertainty about the ‘response’ to a specific rate (demand for carbon; supply of tax avoidance); 3) diversion of revenues to carbon removal tax credits; and 4) to avoid adding to already-unsustainable [federal debt growth](#), the U.S. Treasury must take account of reduced collection of other taxes caused by the taxation of carbon emissions. The Treasury has a [standard policy](#) of assuming a 25% offset rate for new taxes that, if applied to carbon taxation would mean a dividend payout of 75% of the carbon tax revenues, less administrative expenses of delivering the dividends. So, there is room for Congress to harvest a revenue increase. That is contrary to the spirit of the [CLC proposal](#), but not a terrible thing in a country struggling with a [debt crisis](#) formally declared before the costly fiscal response to the Pandemic greatly increased the debt.

If the carbon tax dividend is per capita (vs. per family or household), you may be surprised that there is a solid basis to expect the dividend payments to accelerate population growth. The larger dividend payment reduces the cost of children, and ‘cost’ is an established (though not well known), significant determinant of preferred family size. Population growth will eventually help in the [debt struggle](#), but also raise GHG emissions, among other increased growth-related pressures. Lately, that includes pandemic-induced, travel-increasing urban density concerns. Moreover, per-household-determined dividend payments incentivize smaller household size.

I believe the [unsustainable-federal-debt issue](#) argues for deliberately, partially offsetting revenues expected from efforts to cut GHG emissions. That would provide some cushion against the non-trivial potential to over-estimate revenues. A full or partial offset, likely through lower personal and or corporate income tax rates, could be pursued as a ‘no-regrets’ strategy to improve the efficiency of taxation. Maximum efficiency exists when the last dollar achieved from each tax has the same impact on the economy. An efficiency improvement results when a less costly tax offsets a dollar from a more costly tax. So, ***a no-regrets approach to carbon taxation is for that rate to rise alongside a falling personal or corporate income tax rate until both collect the last dollar for the same economic cost.*** That rate may be much lower than the carbon tax rate in the middle of a wide range of uncertainty that aims to set the carbon tax rate equal to the very uncertain global per-unit environmental cost (MEC). However, given that uncertainty, a carbon tax rate set at the short-term USA economic-fiscal optimum, might be near the MEC for the global commons. That basis for a carbon tax rate avoids the price control effects risk that exists when the rate is set strictly on the very uncertain MEC estimate basis. Given the uncertainty about the revenue, and the federal debt struggles, I favor a partial offset approach based on narrowing differences in the ‘***marginal cost of taxation;***’ a concept absent from the carbon tax literature, and the climate change debate.

VII. Overlooking Opportunities for Progress

The widespread failure to pursue significant opportunities to cheaply, or profitably, reduce GHG emissions is reason to wonder about the competence or seriousness of the entities and people most concerned about the climate change risk. For example, some of them ignore [nuclear](#) energy, or quickly dismiss it as too costly. Inefficient regulatory policies may be the reason for significant costs, and with regard to the regulatory burden, some of what is appropriate for old-fashioned nuclear may not fit some of the emerging nuclear technologies.

Seizing the opportunity to improve the efficiency of our policies to address ground-level pollutants could yield significant GHG-reduction co-benefits. It is bizarre to see analysts pose reductions in ground-level emissions with known, US-centric benefits as co-benefits of GHG-reduction efforts that mostly benefit folks that don't bear the costs. The other way around is a 'no-regrets' approach; GHG emission reductions as a co-benefit of air pollution control reform. Improvements in the efficiency of pollution control policies are worth more than they cost without GHG reductions.

Virtually, any economic inefficiency raises energy use, and thus GHG emissions. An important example is water supply policy. Well-crafted water markets and efficient municipal water pricing policies would greatly reduce the costly transportation and treatment of water.

A carbon tax exploits none of those (above), and only mildly curbs pollutant and GHG emissions that result from rush hour shortages of expressway space (traffic jams), and that result from long commutes between jobs and affordable housing, and/or the best available public school attendance zones. Zoning reform²² and well-crafted school choice expansion²³ would lower the number of such long commutes, while improving the efficiency of our K-12 school systems. So, well-crafted anti-congestion and school choice expansion policies are 'no-regrets' approaches to GHG emission reduction. 'No-regrets' means that the direct benefits can significantly exceed the costs. I recognize that water supply policy reform, revising our approaches to the Clean Air Act's criteria pollutants, congestion fees, and school choice expansion *are heavy lifts, politically*. So is decarbonization. But you make such political-capital-consuming leadership efforts if you believe GHG reduction is vital, and see low cost paths to those reductions. Such policies should be especially important to [political office seekers](#) that want to appeal to voters with climate change concerns, without committing to costly GHG reduction efforts.²⁴ The congressional Republican attempt to do that (propose massive tree planting and research to reduce the cost of carbon capture) is not only weak, but it misses what I regard as a golden opportunity to advance high value policies such as controversial nuclear policy reform, zoning reform, congestion fees,²⁵ and school choice expansion. The opportunity is even greater at the state and local level where policies regarding schooling, water supply, and congestion mitigation are best decided, and in many cases badly needed quite apart from the GHG co-benefits.

I suspect most countries have such no-regrets options. Pushing other countries to address those could significantly reduce GHG emissions, globally, but we'd need to address them here to credibly expect others to make the *politically heavy lift* to change longstanding inefficient ways to do things.

Globally (reaching past the *USA's 15% share of global CO₂ emissions*), a key cause of CO₂ releases is the [forest destruction that results, in many places, from insecure property rights](#) that are usually a symptom of the corruption that [keeps poor countries poor](#). We could demand more secure property rights in return for the developed country-level GHG allowance rates sought by the developing countries. Again, we'd undertake the political heavy lift (you do inexpensive, difficult things to lower the probability of catastrophe) to push 'developing' (maybe) countries to accept the political risk entailed in attacking longstanding inefficient ways to do things. Failure to make that push leaves a lot of GHG reduction on the table and indirectly forgives past and ongoing corruption. Corruption fighters would benefit from linkage of their work to improve economic efficiency at home to international efforts to lower the probability of a climate change catastrophe.

VIII. Moving Forward

Key factors that all serious players should acknowledge include: 1) the availability of 'no-regrets' approaches, including, but not limited to those described above; 2) we need faster progress on ways

to reduce the cost of technologies that may have lower, full life-cycle environmental impacts than fossil fuels. That includes energy storage technologies. That's not just hard-science research; also social science research and political effort to address regulatory policy, taxes, subsidies, and spillover cost assessment; and 3) the low probability that even much more compelling information about climate change trends will, for well-documented political-economic²⁶ and [psychological reasons](#), yield an appropriate global agreement on emission reduction, and adequate compliance with the promises made. From that well-grounded premise, and the poor-compliance-reality, so far, [Aldy and Zeckhauser](#) argue for greater attention to adaptation and **geo-engineering** (also discussed extensively in Wagner and Weitzman's *Climate Shock*).

Much adaptation is a low-regrets strategy. Even if climate change is below the level prepared for, the investments, such as seawalls, still have significant value.

There is a natural resistance to addressing symptoms rather than root causes, but all that **geo-engineering** could mean, and do, needs much attention, especially if we do not take action, and a combination of natural and human-caused triggers yields catastrophic changes; warming or cooling. It may be much cheaper than acting on the Nordhaus, and Wagner and Weitzman, insurance-analogy-based assertion that a high-cost, low, but non-trivial, probability event warrants a costly, potentially worthless massive response.

As improbable as the devastating RCP 8.5 scenario is (it pre-supposes a more than 5-fold rise in the **ANNUAL** rate of increased CO₂ presence in the atmosphere!!), [Hall and Behl](#) reminded us that the geologic record contains episodes of rapid warming that exceed the RCP 8.5 level. Human-induced warming could trigger those, perhaps through methane hydrate release.²⁷ Recall the climatologist that believes that a significant naturally-induced warming is due by 2100. Only **geo-engineering** can potentially be ready to address unanticipated or neglected threats. Getting it ready, if we determine that it can work cost-effectively, will require much more than hard science study of how to cool the earth. We'd need an extensive understanding of likely 'side effects,' and a liability structure to allow it to be deployed productively. We'd also likely prefer to geo-engineer through an international agreement on cost-sharing and deployment procedures. International agreement is always a slow and challenging process, although likely less difficult for taking action against ongoing damage than for gaining commitments to costly mitigation that may not matter, or even be counter-productive (Mörner's warning that a solar minimum will soon yield significant cooling).

The **vast majority** of what I wrote, above, is a resuscitation of facts. Please weigh in on which facts should be added, or deleted, from that central element of the audit. My assertions of irresponsible behavior follow from the high stakes ("getting this wrong will be very costly"), and the obligation of those advocating massive costly changes to effectively back their claims. I have asserted the existence of widely overlooked no-regrets approaches, and I have recommended a particular approach to carbon taxation, should it be adopted, and much increased attention to methane hydrates and geo-engineering.

High housing costs caused by restrictive zoning lead to lots of long commutes.

Appendix A: Why my assessment should interest you.

The need for a full audit is clear; much costly controversy. Here's why my *Assessment* should interest you.

A) **My credentials:** The 'fields' for my Economics PhD are Environmental and Natural Resource Economics and Urban-Regional Economics. As part of the former, I published articles on benefit-cost analysis, and air pollution control policies. As my *Assessment* shows, the urban-regional field is surprisingly relevant.

Location decisions and urban policies are a significant source of targeted emissions. Many potentially important policies are widely ignored.

Environmental services was the declared specialty area for my MA in Economic Geography. As part of that, I was a teaching assistant for the Physical Geography and Climate/Weather courses. So, though I'm far from an expert in those areas, alongside my BS background, that exposure makes me better qualified than most to recognize and formulate critical questions, and understand the answers. My undergraduate degree is multi-disciplinary (physical and social sciences mix: Natural Resources Management).

Vita.

B) Untainted by money: I have earned small sums from organizations on different sides of the climate change controversies, BUT unrelated to this issue. For example, I was a Sierra Club member, and the Environmental Defense Fund paid me to help with a Texas Shrimp Fisheries assessment, and water projects' benefit-cost analysis. The Charles Koch Foundation has funded work on Fiscal Sustainability. Pro bono, I helped the Heartland Institute write an environmental economics chapter for a book addressing the climate change controversies.

This *Assessment* is unfunded. In tune with a prominent San Antonian's advice for new businesses - "work for free" - I am doing this as part of my *Institute for Objective Policy Assessment (IOPA)* start-up. As I write this, IOPA has a bank balance of \$265. I hope this *Assessment* will trigger some donations to have IOPA follow this *Assessment* with a full *Audit*. I can't work for free much longer.

C) My 'outsider' status: This is important because: 1) I don't have past Climate Change-related findings to limit my objectivity or credibility; and 2.) "An informed outsider's perspective should always be welcomed in any field, since insiders tend to reinforce each other's views and prejudices (p 342 of Larry Siegel's *Fewer, Richer, Greener*)."

D) Highly motivated: Many of the perspectives I've asserted are highly controversial, and a few are totally unique. So: 1) There is the potential to make a significant positive difference, which is the motivation for nearly everything I do; and it is *IOPA*'s reason for being; and 2) The reaction to those perspectives will affect my *IOPA* start-up; hopefully, for the better, but I recognize the risk of a disastrous outcome.

As part of D):2), I must note that from the *IOPA* perspective, this is an incomplete assessment. To begin to meet the *IOPA* assessment standard, an *Assessment* needs at least one review by someone that can support a different perspective from mine, and my response. Securing that would significantly delay this initial *Assessment*, so I'm publicizing this as a draft *Assessment*. Later, I'll post a second draft as part of a true *IOPA* assessment. This draft will yield some useful pro bono reviews, which is especially important when the *IOPA* bank balance is \$265 (no money to pay for reviews).

Appendix B: Costly Transition, and an Accountability Nugget

In <https://www.wsj.com/articles/SB10001424052970203646004577213244084429540>:

"Consider then that by eliminating fossil fuels, the recipient of medical care (all of us) is being asked to submit to what amounts to an economic heart transplant. According to most patient bills of rights, the patient has a strong say in the treatment decision. Natural questions from the patient are whether a heart transplant is really needed, and how successful the diagnostic team has been in the past."

And there were even warmer periods a few thousand years ago during the Holocene Climate Optimum.

"The continued efforts of the climate establishment to eliminate 'extreme views' can acquire a seriously threatening nature when efforts are directed at silencing scientific opposition. In our op-ed we mentioned the campaign circa 2003 to have Dr. Chris de Freitas removed not only from his position as editor of the journal *Climate Research*, but from his university job as well. Much of that campaign is documented in Climategate emails, where one of the signatories of the Trenberth et al. letter writes: "I believe that a boycott against

publishing, reviewing for, or even citing articles from *Climate Research* [then edited by Dr. de Freitas] is certainly warranted, but perhaps the minimum action that should be taken."

Politicians kowtow to what people believe, which can differ considerably from the truth. That's why it is important, to hold accountable, people and organizations urging major, costly changes on behalf of climate change factors. Prescient Myron Lieberman quote regarding analyst accountability:

Myron Lieberman in *Educational Morass* (2007, p 292):

"As long as no negative consequences follow even egregiously mistaken credence goods [trusted information and analysis sources], better educational policies are improbable."

I assert that: *"As long as no negative consequences follow even egregiously mistaken credence goods [trusted information and analysis sources], better climate policies are improbable."*

¹ I heard then-Governor Matt Bevin (R-KY) say this.

² See Appendix B

³ <file:///D:/Climate%20Change%20Assessment%20-%20Sept2020/Hall%20and%20Behl,%20Integrating%20economic%20analysis%20and%20the%20science%20of%20climate%20instability,%20Ecol%20Econ.pdf>; <https://www.climatedepot.com/2020/10/05/earths-oceans-used-to-be-20-25c-warmer-than-they-are-today/>

⁴ Dr. Nils-Axel Mörner, the retired head of the paleogeophysics and geodynamics department at Stockholm University: "A new solar-driven cooling period is not far off." <https://thenewamerican.com/un-ipcc-scientist-blows-whistle-on-un-climate-lies/>

⁵ Note also: "Far from being "settled," climate sensitivity remains an active area of investigation and debate."

⁶ <https://www.nature.com/articles/s41558-020-0764-6>;

⁷ In part, relying on an [illusory truth effect](#) through repetition (for example: 'settled science,' 'denial,' 'more intense storms, greater storm frequency').

⁸ This is a huge area for a more detailed audit. Are key people, organizations, and nations behaving consistently with their public policy advocacy?

⁹ [Controversial](#); DICE is much in need of serious scrutiny in an expanded audit.

¹⁰ Ironically, the nuclear waste issue is trivial as it pertains to **increased** production of wastes such as those already in storage at nuclear power plants. Having some **additional waste** does not significantly increase the cost of what we decide to do about existing radioactive wastes. So, the waste disposal issue does not affect the decision to increase (or not) nuclear power use to reduce GHG emissions.

¹¹ <https://www.cfact.org/2020/08/09/renewable-energys-staggering-human-costs/>

For example, consider the copper requirements: A typical internal combustion engine uses about 50 pounds (23 kilograms) of this vital everyday metal. A hybrid car requires almost 90 lb (40 kg); a plug-in EV needs 132 lb (60 kg); and a big electric bus can use up to [812 lb \(369 kg\) of copper](#). **Just to make 15,000,000 California EVs**, we would need almost 1,000,000 tons of copper. Copper ores average just 0.5% metal by weight, notes energy analyst Mark Mills. That means [200,000,000 tons of ore](#) would have to be dug up, crushed, processed and refined to get that much copper. Almost every step in that process would require fossil fuels – and emit carbon dioxide and pollutants. According to Cambridge University Emeritus Professor of Technology Michael Kelly, *replacing all the [United Kingdom's vehicles](#) with next-generation EVs would require more than half the world's annual production of copper; twice its annual cobalt; three quarters of its yearly lithium carbonate output; and nearly its entire annual production of neodymium*. Just one electric car or backup-power battery weighs 1,000 pounds and requires extracting and processing some 500,000 pounds of various ores, Mills says. Consider, then, adding a US-wide EV mandate ([proposed](#)).

¹² Those can be efficient investments in many places; for example, to discourage running major appliances during a 100° afternoon, when air conditioning demand is pushing system capacity.

¹³ <https://news.mit.edu/2020/assessing-value-battery-energy-storage-power-grids-increasing-integration-wind-and-solar-0812>: "help the renewable-energy industry confront **its most intractable problem: storing up energy** (emphasis added) against the surges and lulls that characterize renewables like wind and solar."

¹⁴ http://wiseenergy.org/Energy/AGW/BENTEK_Wind_Power_Paradox.pdf; <https://docs.wind-watch.org/BENTEK-How-Less-Became-More.pdf>; several more references on this subject at wiseenergy.org.

¹⁵ See, for example, the extensive recognition of uncertainty in Wagner and Weitzman's *Climate Shock*, that advocates quick, significant GHG emission reduction.

¹⁶ For example, Eta: <https://weather.com/storms/hurricane/video/why-does-eta-have-the-strangest-forecast-track>

¹⁷ RFF believes recent and projected warming justifies a costly policy response.

¹⁸ That is like saying that Meteor X will strike the earth in 2070 if it speeds up, and alters its course. “Two prominent climate scientists who adhere to United Nations climate assessments [are scolding](#) the media and alarmist scientists for claiming worst-case scenarios are the most likely climate outcome.”

¹⁹ “[In a 2001 progress report](#), the anticipated price of an allowance was \$400-1,000 per ton in 1990 dollars (\$500-1,200 per ton in 2001 dollars), but the actual prices ranged between \$135-210 per ton (EPA, 2002).

²⁰ <https://www.instituteforenergyresearch.org/climate-change/the-social-cost-of-carbon-fantasy/>;

<https://www.heritage.org/environment/report/unfounded-fund-yet-another-epa-model-not-ready-the-big-game>

²¹ Daniel Yergin’s *The New Map* argues that carbon capture is very important.

²² See Brink Lindsey and Steven Teles’ *The Captured Economy* (NY: Oxford University Press, 2017).

²³ See my, *The School Choice Wars* (2001) and *School System Reform* (2019).

²⁴ <https://www.politico.com/news/2020/02/13/gop-climate-change-kevin-mccarthy-115025>: “There’s probably a growing consensus among Republicans that we have to have a serious approach to the issue because it’s important to a lot of American people.

²⁵ The Obama Administration considered using [congestion fees](#).

²⁶ Free-riding on public good (reduced CO₂ emissions) provision.

²⁷ “Investigations of methane hydrates stability dependence on temperature fluctuations, as well as of methane behavior after it is released, are therefore urgently needed;” now even more urgently since that was [said in 2010](#), and Google Scholar revealed nothing newer.